Research Proposal of the Thesis Entitled

The Role of Visual Design in Communicating Environmental Impact in the Pharmaceutical Sector

Submitted by

Jignesh Vasavada

(202406010008)

In Partial Fulfilment of the Requirements
for the Degree Of

Doctor of Philosophy

Under the guidance of

Dr. Om Singh

In the

Unitedworld Institute of Design

KARNAVATI UNIVERSITY,

GUJARAT - 382422

March 2025

1. INTRODUCTION

Industrial waste from sectors such as manufacturing, construction, and pharmaceuticals poses a significant threat to the environment. The byproducts from these industries contribute to pollution and environmental degradation, which directly affects human life and ecological balance. It is crucial for both industry leaders and the general public to understand the importance of protecting the environment. Environmental awareness refers to recognizing the harmful effects of human activities on ecosystems and adopting strategies to mitigate these impacts. Issues like habitat destruction, air and water pollution, global warming, and biodiversity loss have increased the urgency of promoting environmental consciousness. These environmental challenges threaten not only the natural world but also human health and societal well-being. [1]

Environmentally friendly behavior involves actions that prioritize the protection and preservation of the environment. This can include conserving natural resources like water and air, reducing energy consumption, practicing recycling, and protecting biodiversity. Despite growing awareness, research indicates that public understanding of environmental issues, particularly among students, remains limited. Studies reveal a strong connection between people's attachment to their environment and their likelihood to engage in sustainable behaviors. Individuals who feel connected to their surroundings are more inclined to adopt practices that support environmental preservation. [2]

A comprehensive understanding of environmental issues fosters a positive attitude toward ecological protection. People who are aware of environmental concerns are more likely to adopt daily habits that reduce harm and promote sustainability. These attitudes can be observed through tangible behaviors and public statements supporting environmental conservation. Encouraging a broader cultural shift toward environmental responsibility is essential for addressing the pressing ecological challenges we face today. [3].

2. THE ROLE VISUAL DESIGNERS IN ENVIRONMENTAL SUSTAINABILITY

Growing anxieties about ecological issues, shifting climates, poverty, economic differences, and social unfairness have driven a focus on long-term progress [4]. Manufacturing practices significantly impact the planet, causing pollution, forest destruction, species decline, and rising global temperatures. Visual creators are crucial in

establishing a socially structured and lasting environment by crafting answers to ecological problems that don't worsen them. They are recognized for their problem-solving abilities and skill in creating visually engaging designs [5].

To facilitate a shift towards sustainable design, it's crucial to identify and define emerging roles and practices within the field. Designers often possess a strong foundation in design, yet the absence of a sustainable focus in visual design can stem from inadequate education, prevailing trends, and the inherent challenges in integrating sustainability principles into established design norms [6].

Advocating for sustainable practices within the pharmaceutical sector is imperative due to the inherent link between medical activities and environmental impact. Successful conversion of protected natural areas into tourist attractions necessitates stricter preservation standards compared to conventional locations [7][8]. To ensure the viability of these areas, it is recommended to provide comprehensive information regarding the region's resources and implement educational and awareness programs targeting travellers, locals, and those within the tourism industry. Destinations that promote sustainable tourism should deliver extensive information and conduct educational and awareness initiatives to mitigate any adverse effects on these resources. This fosters enhanced preservation and a more equitable balance between tourism development and environmental protection [9][10].

Numerous campaigns, initiated by individuals, the public, and governmental bodies, have been launched to safeguard the environment. Rules for environmental protection have also been established. These campaigns have demonstrated significant impact in various countries, including the USA, UK, and Japan. Examples include Google Doodles in 2021 and 2022, the UN’s #breathlife campaign, initiatives against plastic pollution, and visual design-driven e-waste awareness drives. These campaigns highlight the influence of graphic or visual design in raising public awareness about environmental issues and sustainability. Such graphic designs, which do not contribute to environmental pollution, are termed "green design."

Rapid advancements in science and technology have led to the development of sustainable production methods and "green design theory," which prioritizes the environmental impact and economic feasibility of products [11]. In India, where living standards are generally lower and individual possessions are limited, novel manufacturing technologies and

methods have improved economic conditions, resource availability, and purchasing power. However, India's comparatively low resource occupancy rate exacerbates environmental challenges [12].

Over-packaging and frequent product updates are wasteful practices employed by companies that prioritize profit over resource conservation. Human activities have resulted in the depletion of natural resources, the pollution of ecological environments, and resource wastage. Industrial operations contribute to air, water, and land pollution through exhaust emissions, effluents, residues, and heat. Noise and vibration also have detrimental environmental effects [13].

The disposal of industrial and household waste presents significant social challenges. In response to these issues, green design, an environmentally conscious trend, has emerged. Green design is gaining traction in the US, Japan, Europe, and other countries. Due to these countries' recycling regulations, researchers and industry are actively exploring this domain [14]. The University of Cincinnati (UC) houses an environmental awareness design research centre and a green design portal. The Chartered Institution of Wastes Management (CIPR) has studied green design and production across Europe. The ISO 14000 standards for industrial environmental management systems have prompted manufacturers to market environmentally friendly products [15].

3. LITERATURE REVIEW

Thatcher et al. (2013) defined "green ergonomics" and its connection to human factors for sustainable development. Built upon "ergo-ecology," a broad, interdisciplinary area, green ergonomics offers four design concepts, grounded in both ecological and ergonomic findings. These concepts are: (a) improving eco-efficiency, effectiveness, and productivity; (b) enhancing ecological resilience; (c) promoting local or traditional solutions; and (d) recognizing nature's inherent design significance.

Gao (2023) emphasized the growing global concern over waste, a byproduct of social and technological progress. International scholars acknowledge the vast amount of daily waste, leading to major pollution. Children, as future environmental caretakers, are crucial for environmental education. Integrating waste sorting into education allows for learning tools that teach environmental awareness. These tools teach about pollution's harm and shape children's ethics. This study aims to develop and assess environmental education content

and methods for children, focusing on visual learning. The main goal is to build ecological awareness and enable children to join waste reduction efforts. A review of existing children's environmental education is the basis for this research.

Li (2023) found that digital-era visual programming has transformed art production, allowing for structural changes and freeing art design from traditional media. This research creates a practical environmental learning tool by combining environmental awareness tech with interactive features. The system uses various technologies to understand the environment, including data storage, collection, processing, and scenario management. The system is built with three layers: application, foundation, and user interface. It uses environmental awareness technology to gather and analyze data, compute scenarios, and store information. Visualization technologies provide a node-based visual programming interface. Simulation data shows the system's efficient data processing. The system's memory use, CPU load, requests, and bandwidth correlate positively. This interactive visualization system can improve artistic practices by easing communication, sharing information, and encouraging innovation. The system aligns with future art trends. This paper details a visual system design that integrates environmental awareness and interactive technologies in art design.

Sansoni et al. (2023) observed a gap in higher education's graphic design programs concerning the teaching of sustainable design. As a result, recent graduates and students often prioritize business goals driven by client needs, particularly financial gain, at the expense of environmental concerns like pollution, biodiversity loss, and climate change. This study sought to understand how well graphic design students and recent graduates grasp and apply responsible design in their work. It also examined the ethics of "greenwashing," where designers mislead consumers with partial sustainability claims that ignore the total environmental impact of products. This creates an ethical dilemma for designers, who must balance client demands with their professional values. Graphic design is a powerful tool for conveying value to target audiences. Advertisers use market research to understand their audience's language, culture, and motivations, influencing consumer behaviour. This research analyzed the professional values of graphic design students and recent graduates, and their experience with responsible design in academia and industry. Specifically, it addressed: (1) their ethical frameworks, (2) their understanding of responsible design, and (3) their perceptions of industry practices. The findings will be used to create educational materials for educators and industry professionals.

Du et al. (2023) used bibliometric analysis, with the CiteSpace tool, to explore the research framework, development, and key issues in green design. They analyzed 1,775 publications from the Web of Science (WoS) database and 1,923 from the China National Knowledge Infrastructure (CNKI) database. The study presented four key findings: (1) Green design saw rapid growth starting in 2015, with a focus on energy efficiency and material selection, leading to increased collaboration and publications. (2) The CNKI database has the most research and is highly popular, while WoS shows the United States as a leader in scholarly impact and interdisciplinary collaboration. WoS emphasizes practical applications in fields like chemical engineering, while CNKI focuses on design technology, management, and theory. WoS covers diverse research methods, whereas CNKI prioritizes theoretical design. These databases offer complementary insights for advancing sustainable design. The study defined green design as an approach that integrates environmental awareness with optimized human and managerial practices, innovative design concepts, sustainable processes, and sociocultural impacts.

A.K. Jharotiya (2011) underscored the media's vital role in boosting environmental awareness. He noted our familiarity with our surroundings, defining the environment as everything impacting our habitation, including air and water. The increasing significance of environmental issues necessitates traditional public awareness campaigns, with mass media as a key tool. The environment, crucial for survival, has been degraded by human activity. Recognizing this, efforts are underway to rectify the damage. Media coverage can significantly aid environmental initiatives, as exemplified by the Indian government's 'Swachchha Bharat Abhiyan' sanitation campaign, which succeeded through government-media collaboration.

Yudhanto S.H., et al. (2023) focused on the importance of cultural and communicative factors in visual design. Designers, with both academic and practical experience, must grasp cultural and communication principles to create effective designs that resonate with their audience. This entails analyzing the target audience's values, norms, language, and beliefs to ensure designs meet expectations. Visual elements, such as color, font, symbols, and imagery, must align with the audience's cultural background. Designers require a suitable and quantifiable design concept tailored to user needs. Testing and evaluation should involve trials with the target demographic, followed by assessing their reaction to the design's message and clarity. Ultimately, cultural and communicative understanding is paramount for creating successful visual designs.

Grazuleviciute-Vileniske, I., et al. (2021) examined the importance of aesthetics in sustainable design evaluation. This research combined a literature review with findings on aesthetics' role in sustainable architecture. It explored how building sustainability is assessed, including certification systems like LEED and BREEAM, and whether they consider cultural and aesthetic factors. The study proposed four architectural concepts to balance human and environmental needs: sustainable aesthetics, genius loci, biophilia, and regenerative design. These concepts were found to enhance the aesthetic quality and uniqueness of sustainable buildings.

Alahira, J., et al. (2024) discovered that graphic design and sustainability create a space for eco-friendly industrial design. This analysis showed how fine arts can contribute to industrial sustainability through graphic design. Graphic design can promote eco-solutions. Eco-design balances visual appeal and utility with minimal environmental harm. Fine art elements, like painting, sculpture, and photography, demonstrate sustainable practices. Graphic designers raise awareness by using nature, conservation, and sustainable living in their work. In industrial design, visual designers and product developers create sustainable products. Considering materials, production, and disposal, eco-design makes visually pleasing and eco-friendly products. Designers use recycled, simple, and biodegradable materials. Eco-design includes digital experiences, branding, and products. Digital platforms can promote sustainability. Fine art in graphic design improves industrial sustainability. Designers can create a sustainable future using creativity and visual communication. Eco-design balances creativity with environmental care.

4. AIMS AND OBJECTIVES

- This study aims to find out how much visual design helps people understand environmental awareness. In addition to the investigation's stated objectives, the following are also included:
  - To visualize the importance of visual design for environmental awareness among employees of industries ranging from IT, Transportation, Healthcare, Construction, etc.
  - To assess the values of visual design for the people to know about environment sustainability and thereby presenting their point of view on sustainability.

5. PROBLEM STATEMENT

With the growing urgency of environmental issues, public understanding and engagement remain limited. Conventional methods of conveying this information may not be effective. Visual design has the potential to bridge this gap by translating complex information into clear, engaging messages. This study aims to investigate how visual design, particularly when integrated with green design principles, can enhance comprehension and awareness of environmental issues. Additionally, it seeks to empower people to become active participants in protecting our planet.

6. DESIGN/ METHODOLOGY

Research methodology

This study will use a combination of different research methods, both qualitative and quantitative approaches to comprehensively understand "**Role of Visual Design in Communicating Sustainability & Environmental issues**"

Selection of Subject:

We have selected visual design enhances environmental awareness in this research. For this research, we have selected pharmaceutical industry as their wastes are more affecting to environment hence to raise a concern of environment and it's sustainability visual design may be more effective.

7. Research Area

For this research, we have selected the Gujarat. To that effect, we have selected four pharma companies within Gujarat location.

Primary data collection

Research methodology

This research will employ a mixed method approach, both qualitative and quantitative approaches to comprehensively understand the role of visual design in communicating sustainability and environment issues.

Primary data collection

A sample size of 400 respondents will be used for this study, encompassing three groups (1) Visual designers (2) Environmental NGOs working with the pharma industry and (3) Personnel of the industries relevant to the study.

For the fulfilling the research requirements, we will collect the data from the people of society and designers what exactly they think about the visual designing with green design concepts.

Secondary data collection

The secondary data will be collected from the published papers, journals, websites etc. to justify our results of the analysis.

8. LIMITATION OF THIS RESEARCH

Despite the impact of visual design on environmental attention, this research acknowledges certain constraints. The selected pattern size and demographics (400 respondents from Gujarat, India) might not be representative of world populations. Subjectivity in visual belief would possibly have an effect on the layout's impact. Quantifying the long-term changes in behavior caused by visual exposure is a significant challenge. The research focuses on the role of design in communication rather than the actual solutions themselves. Several variables, including but not limited to design, social conventions, and economic concerns, ultimately shape environmental awareness.

9. REFERENCES

1. Pramita, F., Taufik, M., Jumailah, Ikal, I., & Subroto, G. (2023). The significance of environmental awareness for protecting nature and cherishing the earth. *BIO Web of Conferences*, *79*, 01001. https://doi.org/10.1051/bioconf/20237901001
2. Negi S., (2023). Researchgate.net. Retrieved May 20, 2024, from https://www.researchgate.net/publication/369255062_environmental_education_and_environmental_awareness
3. Verma, A., & Verma, V. (2022). Environmental awareness among students. *International Journal for Research in Applied Science and Engineering Technology*, *10*(4), 945–948. https://doi.org/10.22214/ijraset.2022.41306
4. Joseph E., (2019). Academia.edu. Retrieved May 20, 2024, from https://www.academia.edu/49478176/The_Place_of_a_Graphic_Designer_in_Environmental_Sustainability

5. Blowers, A., Boersema, J., & Martin, A. (2012). Is sustainable development sustainable? *Journal of Integrative Environmental Sciences*, *9*(1), 1–8. https://doi.org/10.1080/1943815x.2012.666045
6. Dritz, A. (2014). *Closing the Sustainability Gap:The Emerging Role of Sustainable Graphic Designer. MA Thesis Unpublished. Minneapolis College of Art and Design*
7. Vallverdu-Gordi, M., & Marine-Roig, E. (2023). The role of graphic design semiotics in environmental awareness campaigns. *International Journal of Environmental Research and Public Health*, *20*(5), 4299. https://doi.org/10.3390/ijerph20054299
8. Cristobal-Fransi, E., Daries, N., Ferrer-Rosell, B., Marine-Roig, E., & Martin-Fuentes, E. (2020). Sustainable Tourism Marketing. *Sustainability*, *12*(5), 1865. https://doi.org/10.3390/su12051865
9. Marine-Roig. (2019). Destination image analytics through traveller-generated content. *Sustainability*, *11*(12), 3392. https://doi.org/10.3390/su11123392
10. Borawska, A. (2017). The role of public awareness campaigns in sustainable development. *Economic and Environmental Studies*, *17*(44), 865–877. https://doi.org/10.25167/ees.2017.44.14
11. CenCITT in the US, BMFT in Germany, ENEA in Italy, ETH in Switzerland, three national committees in the UK, and the Science and Technology Department in Japan all conduct green science and technology research.
12. Bai, K. (2019). A study on the application of green design theory in environmental art design. *IOP Conference Series. Materials Science and Engineering*, *484*, 012051. https://doi.org/10.1088/1757-899x/484/1/012051
13. Hossain, M. S. J., & Ahmad, N. (2011). Green design principles and trends of using them among Bangladeshi consumer goods manufacturers. *2011 IEEE International Conference on Industrial Engineering and Engineering Management*.
14. Bilec, M., Ries, R., & Matthews, H. S. (2007). Sustainable development and green design—who is leading the Green initiative? *Journal of Professional Issues in Engineering Education and Practice*, *133*(4), 265–269. https://doi.org/10.1061/(asce)1052-3928(2007)133:4(265)
15. yi-fei, G. (2017). Green innovation design of products under the perspective of sustainable development. *IOP Conference Series. Earth and Environmental Science*, *51*, 012011. https://doi.org/10.1088/1742-6596/51/1/012011

16. Thatcher, A., Garcia-Acosta, G., & Morales, K. (2013). Design principles for green ergonomics. In *Contemporary Ergonomics and Human Factors 2013* (pp. 319–326). Taylor & Francis.
17. Gao, H. (2023). Research on visual-oriented design of children's environmental education. *BCP Education & Psychology*, *10*, 261–264. https://doi.org/10.54691/bcpep.v10i.5389
18. Li, J. (2023). Visual design of art based on interactive technology and environment aware intelligent devices. In *Research Square*. https://doi.org/10.21203/rs.3.rs-2749399/v1
19. Sansoni, S., Torrens, G., & Downs, S. (2023). The role of graphic design in promoting sustainability and ethical responsibilities against greenwashing. *Proceedings of the International Conference on Engineering and Product Design Education, EPDE 2023*.
20. Du, Y., & Ma, H. (2023). A study on the visual communication and development of green design: A cross-database prediction analysis from 1972 to 2022. *Sustainability*, *15*(8), 6359. https://doi.org/10.3390/su15086359
21. A.K. Jharotiya (2011). Researchgate.net. Retrieved May 19, 2024, from https://www.researchgate.net/publication/323751233_Role_of_Media_in_Enhancement_of_Environmental_Awareness
22. Yudhanto S.H., Risdianto F., Artanto A.T., (2023). Core.ac.uk. Retrieved May 19, 2024, from https://core.ac.uk/download/589926536.pdf
23. Grazuleviciute-Vileniske, I., Viliunas, G., & Daugelaite, A. (2021). The role of aesthetics in building sustainability assessment. *Spatium*, *45*, 79–89. https://doi.org/10.2298/spat2145079g
24. Alahira, J., Ninduwezuor-Ehiobu, N., Olu-lawal, K. A., Ani, E. C., & Ejibe, I. (2024). Eco-innovative Graphic Design practices: Leveraging Fine Arts to enhance sustainability in Industrial Design. *Engineering Science & Technology Journal*, *5*(3), 783–793. https://doi.org/10.51594/estj.v5i3.902

Signature of Student

Jignesh Vasavada

Signature of Supervisor

Dr. Om Singh